which made Captain Talcott's method easy of application for field use at geodetic stations. Professor Chauvenet says of the zenith telescope, —

"The method of finding the latitude by this instrument, now known as Talcott's method, is one of the most valuable improvements in practical astronomy of recent years, surpassing all previous known methods (not excepting that of Bessel by prime vertical transits) both in simplicity and accuracy."

Soon it was found that observations by Talcott's method, with the zenith telescope, were superior in precision to the places of the stars observed as given in the catalogue. Hence arose a demand for better star-places; and the observatories of the country were called upon by the coast survey to furnish them, the coast survey paying for the labor involved in observation and reduction. The directors of the observatories, finding their instruments and means insufficient for the desired results, applied themselves to procure better; and thus again the coast survey, by the stimulus it gave to astronomical means and methods, added another to its list of aids given to the advancement of American science. As a consequence, in a large part due to this cause and to those mentioned in what has been said respecting telegraphic determinations of longitude, we have at present catalogues of star-places of a degree of precision of the highest order.

In 1867, Assistant George Davidson invented and added to our means an ingeniously contrived instrument for observing both latitude by the Talcott method, and local time as usual with a transit instrument, by one and the same instrument. This 'combination instrument' is now largely and successfully used.

Geodesy.

All contributions by the coast survey to science in this department must, of necessity, be practical in their character, since the principles involved in the application of all geodetic methods are as old as Euclid.

Improvement in accuracy of geodetic instruments of every class, and especially in improving their precision while diminishing their size and weight, has been marked and steady from 1844 to the present time. More precise observations are now obtained with a theodolite having a graduated circle of twelve inches diameter than could be had in 1844 with instruments having circles of twenty-four and thirty inches diameter. When it is considered that these instruments are transported to the highest summits of North America, often upon the backs of mules, it will be perceived what a gain to precise scientific observation is obtained by the diminishing of weight.

The substitution of the observation of directions for that of angles is another gain to science. The change of the problem to be ascertained by observation, from 'What is the most probable measure of a certain angle?' to 'What is the most probable direction of a certain line?' has added greatly to ease of observation, and precision in results.

Methods of determining azimuth, or the angle made by any geodetic line with the meridian of the place of observation, have been simplified and multiplied, and increase of precision obtained, with less labor and in less time.

Wherever it had become necessary to use artificial elevations for geodetic observations, it had been usual in Europe, India, and America, to use repeating theodolites which only required temporary stability, not usually exceeding a couple of minutes at a time. For important primary stations, brick towers were erected; or, if wooden towers were used, they were carefully enclosed to protect them from the sun's action. But in 1868, Professor Peirce, then superintendent of the coast survey, authorized the use of open wooden insulated tripods for supporting the larger direction instruments of the coast survey.

The legs of the tripods were exposed to the full action of the sun's rays, while shaded by light cotton screens from the force of the wind. The motion of the wooden tripod caused by the action of the sun's rays was eliminated from the result by the method of observation adopted. Since that period the largest and most delicate theodolites have been successfully used upon cheap wooden structures in many parts of the country, and money and time saved with no falling-off in precision.

Within the past ten years the old methods in vogue a century ago, of observing upon intensified lights at night, have been renewed, using both magnesium and coal-oil reflector-lamps, and much time has been saved by adding to the number of hours when observation was possible. The precision of the work has also gained by night observation.

Topographical methods have also been improved. The use of the plane-table has been extended, and this unrivalled method of executing precise maps, by making and correcting them upon the ground itself, is now regularly taught in some of our scientific schools, as are other coast-survey methods of observation, reduction, and computation. In every institution of learning in this country, at Cambridge, New Haven, New York, Ithaca, the coast survey has left its impress, and everywhere for good.

The coast survey is as well able to continue its course now as it ever has been. Its officers are as able and zealous as they were twenty years ago. Its form of organization has proved itself well adapted to its needs, and, with some essential changes to cause it to conform more closely to the changed external conditions, it may do the country thorough and vigorous service. It is to be devoutly hoped that the opportunity may be given it to prove what it is made of, and that its force may be more concentrated, instead of being broken up and scattered.

C. O. BOUTELLE,
Asst. U. S. coast and geod. surv.

An old work on political economy.

The last numbers of *Science* brought to my memory the time of 1842, when I studied in Paris, and had, by the request of my father, professor of political economy, to procure for him a large number of books and tracts on political economy. Some of them were very rare, even in the libraries, and I had to content myself with making out a very full and detailed account of their contents. Among them was, 'Traité de l'oeconomie politique, dedié au roi,' etc., by Antoine de Montchretien, seiur de Vateville à Rouen, 1615 pet. 4°. The book was only to be found in the Bibliotheque Mazarine and St. Genieve, not in the Royal library. It was considered very rare The book is interesting, as the phrase 'political economy' is first used in it, and its author considered to be its founder. The book is very interesting, praises Tully and his maxims, and is decidedly strong for protection. There are also to be found in it a number of curious

notices. It states that in a room in the large spire of the cathedral of Strassbourg, then belonging to Germany, was preserved the first press, with which Gutenberg had printed his books.

DR. H. A. HAGEN.

Cambridge, Dec. 20.

Reineke Fuchs in political economy.

It is a pity that the recent discussion in *Science* on political economy should end in a kind of mutual triangular contempt. The questions raised are extremely interesting, and especially in the view which Mr. James seemed to take at first; that is, whether we can consider such questions entirely aside from their effect on human character. So far as the principles of political economy are concerned, is it right to lie, cheat, steal, rob, and murder, provided, of course, that one is not caught red-handed. This seems to be the teaching of orthodox political economy, and it is well to state the result plainly. In Goethe's version of the old story, Reineke was successful, and at last became chancellor of the kingdom. But there remain some sentimental people, generally poets, clergymen, and women, who will not believe in Reineke.

ASAPH HALL.

Washington, Dec. 22.

A new meteoric iron from West Virginia.

Through the courtesy of Dr. H. C. Torrey, U.S. assayer in New York, I have come into possession of a mass of meteoric iron weighing about 240 grams, said to have been found near Charleston, Kanawha county, W.Va. It is evidently a fragment from a larger mass, as on no portion of its surface does it present any appearance of the crust invariably forming the exterior of an iron meteorite.

It belongs to the megagramic order of Shepard (the Grobe lamellen of Brezina's new classification), and closely resembles the Sevier county (Tennessee) iron. Its structure is coarsely granular or crystalline, having distinct rhomboidal crystals embedded in the mass. Thin laminae of schreibersite are sparingly distributed throughout, but not in such a manner as to produce the common type of Widmann figures. When a polished surface is etched, it shows a somewhat tessellated arrangement of the figures formed by alternate bands or blocks of kamacite and plessite; but the blocks are irregular in outline, and somewhat wedge-shaped, with rounded sides and angles. Instead of presenting a homogeneous surface, these blocks seem to be cemented together like those of the Arva iron, the distinguishing features of these two falls being confined principally to two points, so far as relates to their general appearance upon an etched surface: viz., the schreibersite shows conspicuously in stone laminae or blocks in the Arva, and only in scattered thin leaves in the West Virginia; and the former is especially subject to oxidation in spots, while the latter seems to be free from them, and it also receives a higher polish, and shows a little lighter color. It was found in 1883, and other pieces are said to exist in Kanawha county. Its time of fall is not known. The British museum possesses a 2,699-gram mass of iron, stated to have been found in Greenbrier county, W.Va., sufficiently contiguous to Kanawha to imply that both irons may have formed part of the same original mass.

In answer to a description of my iron sent to Mr. Davis of the British museum, Mr. D. expressed the opinion that such was the fact, which is confirmed, in my judgment, by his minute description of the museum iron above referred to, which, like my own, is wholly wanting in any thing like a crust. A further comparison with the Sevier county iron shows a like identity in all respects except in the graphitic content, which seems lacking in the West Virginia masses, but altogether so close in appearance and structure as to suggest that both might have come from one original mass. This inquiry must remain a mere suggestion, not fully to be solved even if the separate analyses should closely agree. It is to be hoped for, and yet possible, that fragments may yet be found showing the natural crusted exterior, and that we may learn whether these fragments were all found at one spot, or at such distances apart as to indicate the bursting in mid-air of an iron meteorite, and the scattering of its fragments over an extended line of flight. Of its chemical constitution and the circumstances of its fall, we are quite ignorant.

S. C. H. BAILEY.

Cortland-on-Hudson, N.Y., Dec. 21.

The English sparrow.

Apropos to the discussion on the merits and demerits of the English sparrow pest, it may be interesting to the readers of *Science* to know a little of the way the bird is viewed in England. The London *Academy* says, "It is hard for a lover of birds to approach the 'sparrow question.' Sparrows are found to do more harm than snakes or tigers. Nature's thieves and vagabonds, they are. This is the verdict of every one who investigates the matter. They drive away birds which do more good, and little, if any, harm. For every noxious insect they destroy, they consume more corn than one likes to calculate. A Cheshire farmer, indeed, estimates the loss to England, due to depredations of sparrows, at £770,-094 in a year, and this loss is on the increase. No amount of sensationalism can find any countervailing advantage. The careful and long-continued experiments of Colonel Russel in Essex show that sparrows do unmitigated mischief, and the experience of our colonies and of the Americans confirms the facts beyond cavil. There is really nothing to be said for the sparrow. He carries destruction with him wherever he goes, and leaves devastation to mark his increase. From every point of view, he must be looked at as the enemy of man. Either he must give way to us, or we to him; and just now his power is such that he seems in a fair way to become here, as he has already become in Australia, a factor in politics.

"The Colorado beetle can never commit such ravages as the sparrow is certain to do wherever he is allowed to go on unchecked. Love him as we may for his personality, he ought everywhere to be exterminated with the utmost vigor, for there is no limit, in the course of nature, either to his reproductiveness or to the mischief which he causes. We in England have little conception of the scourge he has proved to be wherever he has been naturalized in foreign lands. It is none too soon to have the question put before us clearly, for every day its importance must become greater." There may be some points in this that are overdrawn and exaggerated, but the general tenor of the notes shows that the pest is giving trouble in its native home as well as here.

RALPH S. TARR.

Washington, D.C., Dec. 18.